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BEFORE THE ARIZONA CORPORATION COMMISSION

COMMISSIONERS

TOM FORESE, Chairman
BOB BURNS
DOUG LITTLE
ANDY TOBIN
BOYD DUNN

IN THE MATTER OF THE APPLICATION OF ARIZONA PUBLIC SERVICE COMPANY FOR A RULING RELATING TO ITS 2017 DEMAND SIDE MANAGEMENT IMPLEMENTATION PLAN.	DOCKET NO. E-01345A-16-0176 **UPDATED AND MODIFIED APS 2017 DEMAND SIDE MANAGEMENT PLAN FOR 2017** **-AND-** **REQUEST TO INCREASE THE CAP ON ALLOWABLE DEMAND RESPONSE AND LOAD MANAGEMENT PEAK DEMAND REDUCTIONS**

APS files the attached Updated and Modified 2017 Demand Side Management Plan for 2017 (Updated Plan) consistent with Decision Nos. 75679 (Aug. 5, 2016) and 75865 (Dec. 5, 2016). The Updated Plan (i) incorporates the Demand Response, Energy Storage and Load Management program (DRESLM) that APS filed on December 5, 2016 as ordered by the Commission, (ii) outlines a strategy to increase demand

reductions from energy efficiency programs in 2017 by 25 percent as compared to the reported 2015 peak demand reductions, and a strategy to increase peak demand reductions from demand response and load management programs (excluding time-of-use and other rates) in 2017 by 30 percent compared to the reported 2015 peak demand reductions from demand response and load management programs, and (iii) provides an update about the DSM strategies and technologies discussed in the May 2014 Emerging Technology workshop. A brief summary of each of these modifications is discussed below.

Lastly, APS petitions the Commission to increase the 10% cap on the energy credit that can be received toward the Energy Efficiency Standard (EES) for demand response and load management programs contained in R14-2-2404(c).

I. PROGRAM UPDATES AND MODIFICATIONS

The Updated Plan contains the following revisions and modifications:

- The Commission Ordered Demand Response, Energy Storage and Load Management program that APS filed for approval on December 5, 2016. The program will include battery storage, thermal storage and demand response. As proposed it will cost approximately $4M that will be funded with collected, but unspent, DSMAC funds. It is anticipated that this program will generate peak demand reductions of approximately 13.25 MW.
- Strategies to increase peak demand reductions from energy efficiency (EE) programs by 25% over 2015 levels and increase peak demand reductions from demand response and load management (DR/LM) programs by 30% over 2015 levels. To meet these increased goals, APS will emphasize EE measures that have a larger impact on peak demand and implement the DRESLM program, once approved by the Commission. It is anticipated that employing

these strategies will result in peak demand savings of approximately 139.9 MW from EE programs and 38.2 MW from DR/LM programs.

- APS is currently implementing or requesting approval to implement nine of the ten DSM strategies/technologies that were discussed in the Commission-led technology workshops in May of 2014. The status of each strategy and/or technology is summarized below.

DSM Strategy/ Technology	**Results and Status in 2017 DSM Plan**
Behavioral Energy Efficiency	APS currently implements a behavioral energy efficiency program known as its Conservation Behavior program.
Demand Response	APS currently implements a commercial demand response program known as the Peak Solutions program. In addition, it proposed a residential Demand Response, Energy Storage and Load Management program on December 5, 2016 that include battery and thermal storage and expanded demand response components.
Demand Response w/ Behavior	APS began implementing Behavioral Demand Response with residential customers in 2016 as part of the Conservation Behavior program.
Combined Heat and Power	APS currently considers any Combined Heat and Power projects as a custom measure within the Solutions for Business Non-Residential programs. Although the measure is available in 2017, APS does not anticipate any specific Combined Heat and Power projects in 2017.
Strategic Energy Management	APS does not currently implement a specific Strategic Energy Management program. However, APS implements many of the same technologies and strategies that are deployed in a Strategic Energy Management program including: baseline measurement, providing sub-metered data (through the Energy

	Information Services program), continuous improvement, and retro-commissioning.
Conservation Voltage Reduction	APS currently implements Conservation Voltage Reduction on 11 distribution feeders.
Integrated Energy Efficiency	APS currently implements all DSM programs with an integrated strategy. In addition, the Demand Response, Energy Storage and Load Management program filed on December 5, 2016 is designed to further enhance integrated energy efficiency offerings such as smart thermostats and grid connected heat pump water heating.
Smart Thermostats	APS began implementing smart thermostats as a measure within the Consumer Products program in 2016. In addition, the Demand Response, Energy Storage and Load Management program filed on December 5, 2016 proposed a smart thermostat demand response and load management program.
Residential Energy Automation	APS filed the Load Management Technologies pilot on June 1, 2016 in the initial 2017 DSM Plan, which includes home energy management systems, advanced load controllers, and connected pool pumps.
Enhanced Analytics	APS is currently working with First Fuel to conduct enhanced analytics as part of the Solutions for Business program.

II. REQUEST TO INCREASE THE AMOUNT OF DEMAND RESPONSE, LOAD MANAGEMENT AND PEAK DEMAND REDUCTIONS THAT COUNT TOWARD COMPLIANCE WITH THE EES.

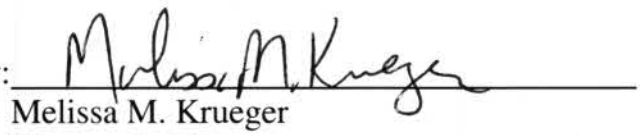
A.A.C. Rule 14-2-2404(c) limits the amount of peak demand reduction from DR/LM programs that a utility may count toward its compliance with the EES to 10 percent of each year's goal. Specifically, the Rule states: "[t]he credit for demand response and load management peak demand reductions shall not exceed 10% of the energy efficiency standard set forth in subsection (B) for any year." A.A.C. R14-2-2404(c).

For the 2017 plan, the 10% cap limits the amount of energy savings from DR/LM programs that APS can count toward compliance, which in this case equates to approximately 56,200 MWh. This artificial limit is at odds with the realities of what is needed on the APS system and contravenes the emphasis the Commission placed in Decision No. 75679 on the need to explore and employ additional strategies designed to reduce peak demand. Accordingly, good cause exists under R14-2-2419(A) to waive the 10% cap contained in R14-2-2402(c). APS requests the Commission waive the 10% cap and allow APS to count toward compliance all savings resulting from DR/LM programs coming from Commission approved DSM programs in the Updated Plan, including the DRESLM program. APS anticipates that these programs will result in savings of approximately 58,000 MWh in 2017.

III. CONCLUSION

APS requests that the Commission expeditiously process its Updated Plan and grant the waiver requested herein of the 10% cap.

RESPECTFULLY SUBMITTED this 27th day of January 2017.

By: 

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Arizona Public Service Company

Demand Side Management Implementation Plan for 2017

Modified Filing 1/25/17

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I. Introduction

Arizona Public Service (APS or Company) is required to file an implementation plan describing how the utility will meet the Energy Efficiency Standard (EES) for the next one to two years.[1] The Company is expected to achieve cumulative energy savings of 22% of its retail sales with Energy Efficiency (EE) and Demand Response (DR) programs by 2020.[2] APS's 2017 Demand Side Management (DSM) Implementation Plan (Plan) describes and outlines how APS plans to meet compliance with the EE Rules and previous Commission Orders. The 2017 DSM Plan provides a balanced mix of programs targeted to address APS's diverse customer segments and market opportunities for both Residential and Non-Residential customers. These programs are expected to produce cost effective energy and demand savings in 2017. As discussed herein, the 2017 Plan proposes to continue previously approved programs with some modifications, requests approval for 3 new prescriptive measures, and will implement three new pilot programs.

This Modified 2017 Plan, which was ordered by Decision No. 75679, includes the new residential Demand Response, Energy Storage and Load Management program which APS filed on December 5, 2016, as well as a description of how APS intends to meet the increased peak demand (in MW) reduction goals in 2017.

A. Highlights of the Plan

- Discusses changing resource needs, opportunities for DSM programs to assist with integration of rooftop solar on the grid, and the need to better consider the value of load shifting and peak demand reductions.
- Introduces three new DSM pilot programs: 1) Energy and Demand Management Education Pilot; 2) Transmission & Distribution Pilot (T&D Pilot); and 3) Load Management Technologies Pilot.
- Requests continuation of EE and DR programs approved in the most recent DSM Implementation Plan.[3]
- Proposes three new Non-Residential prescriptive measures.
- Suspends the following Non-Residential measures due to a projected lack of cost effectiveness in 2017: CO2 Sensors and Coin Operated Laundry.
- Terminates incentives for T8 and CFL fluorescent lighting technologies within the Residential and Non-Residential programs and forecasts greater participation in incentives for LEDs, a more efficient technology.
- Reduces incentives for Residential New Construction, Residential and Non-Residential LEDs, Non-Residential Whole Building Design and Non-Residential Custom measures.
- Proposes a smoothed 2017 goal of 562,000 Megawatt Hours of energy savings.
- Includes a proposed residential Demand Response, Energy Storage and Load Management program, as well as information indicating how APS intends to meet the increased peak demand MW goals in 2017, as ordered in Decision No. 75679.
- Proposes a budget of $66.6 million and maintains the current DSM Adjustor Charge (DSMAC), while funding the Demand Response, Energy Storage and Load Management

[1] A.A.C. R-14-2-2405.
[2] A.A.C. R-14-2-2404.
[3] Decision No. 75679 (August 5, 2016).

program with up to $4 million of collected, but unspent funds, from the DSMAC balancing account in accordance with Decision No. 75679.

All of the proposed or continuing programs and measures have been found to be cost effective, as measured by the Societal Cost Test using the ACC Staff methodology per Decision No. 74406 (March 19, 2014). In addition, APS screened all measures using several alternative methodologies including varying the discount rate to 2%, levelizing the value of future capacity savings, and using more granular 8760 hourly load shapes for all measures to show their savings contribution and avoided cost impacts in all hours of the year. The results of the supplemental analysis are provided in Appendix A, and in work papers submitted to Staff.

B. Changing Resource Needs and DSM Opportunities

APS continuously strives to align DSM programs and energy efficiency resources with APS resource needs. During the planning process for each DSM Implementation Plan, APS is required to review the cost effectiveness of all energy efficiency programs and technology offerings using updated avoided costs. Currently, avoided costs are low due to continuing low natural gas prices, making energy efficiency programs less cost effective than they previously were. In addition, the continued penetration of rooftop solar is causing changes to the system load shape (*i.e.* emerging 'duck curve' shape) which further reduces avoided costs during midday hours, when there is an abundance of low cost energy available on the grid. This change makes avoided costs much more time dependent, requiring the Company to closely examine the time during the day when energy use is reduced.

To stay cost effective and focus program spending on the highest value savings, the DSM portfolio needs to evolve to align with these changing resource needs by focusing programs on reducing the late afternoon and early evening energy usage and peak demand rather than midday reductions when energy is low cost and abundant on the system. In particular, demand side measures that shift consumption into the period of peak solar production, which is also the period of lowest hourly production costs, can have beneficial impacts to the system. These load management measures can have the benefit both of reducing total costs of serving load, and also increasing the ability of the grid to accept more renewable energy. In recognition of these changes in load patterns and renewable generation, APS looks forward to transitioning the current portfolio of energy efficiency measures to peak demand management programs that will provide a high value to customers, and align better with system resource needs.

In furtherance of this goal, APS is introducing three distributed energy resource (DER) pilots as part of this Plan, including: 1) a pilot to assess the value and potential savings of new consumer education tools to help customers save energy and reduce peak demand, 2) a pilot to study the value of targeted DSM on T&D operations, and 3) a pilot to examine peak load management and load shifting technologies.

Increasingly, the future of DSM involves an integrated approach to DERs for managing energy demand and shifting load on the grid. In such a changing environment, it is important to maintain an open dialogue about how the EES can be flexibly applied to better value the benefits of load management in meeting resource needs and achieving credit toward EE goals.

II. 2017 Estimated Savings Goal

For the 2017 Plan, APS proposes an annual savings target of 562,000 MWhs, consistent with the 5-year average savings goal that APS proposed in the 2016 DSM plan. This was calculated by dividing the total savings needed to meet EES compliance in 2020 equally over the five year remaining timeframe starting in 2016, as can be seen below in Table 1 line 7 titled "APS Proposed Annual Savings Goal (MWh)".

Table 1

Calculating 2017 Estimated Savings Goal

	Program Year	2015**	2016	2017	2018	2019	2020
1	Projected Retail Sales (MWh)*	27,398,270	27,904,566	28,357,791	28,907,142	29,467,496	29,947,215
2	Cumulative Annual EES Savings Targets (%)	9.50%	12.00%	14.50%	17.00%	19.50%	22.00%
3	Cumulative EES Savings (MWh)	2,578,312	3,287,792	4,046,162	4,820,824	5,636,893	6,482,849
4	Annual EES Savings Targets	552,069	709,480	758,370	774,662	816,068	845,956
5	Less Credit for Pre-EES Savings	-	84,993	169,986	226,648	283,310	328,955
6	Annual EES Savings Goals (MWh)	552,069	624,487	588,384	548,014	532,758	517,001
7	APS Proposed Annual Savings Goal (MWh)	552,069	562,129	562,129	562,129	562,129	562,129
8	Total Cumulative Savings - APS Proposed	2,578,312	3,225,434	3,957,549	4,746,326	5,591,765	6,482,849
9	Cumulative EES Savings (%)	9.55%	11.77%	14.18%	16.74%	19.34%	22.00%

*Excludes line losses and sales to Freeport McMoran facilities that are exempt from the EES.

** 2015 Retail Sales and Annual EES Savings are actuals achieved in 2015.

The Plan is targeted to save an estimated first year 562,000 MWh of energy (rounded to the nearest 1,000 MWh), which is estimated to be equivalent to approximately 14% of forecasted retail sales for 2016, when added to 2011 through 2015 actual reported DSM savings. In 2017, APS expects to achieve savings of 441,000 MWh from DSM programs, 56,000 MWh from DR programs, 41,000 MWh from Codes and Standards, 20,000 MWh from APS System Savings, and 4,000 MWh from the Energy and Demand Management Education and Load Management Technologies Pilots.

In addition, Decision No. 75679 ordered APS to modify the 2017 plan to increase the peak demand reduction (in MW) from EE programs in 2017 by 25 percent compared to the reported 2015 peak demand reductions from EE programs, and to increase the peak demand reduction capability (in MW) from DR and load management programs (not including Time-of-Use or other rates) in 2017 by 30 percent compared to the reported 2015 peak demand reductions from DR and load management programs. This results in a peak demand goal from EE programs of 139.9 MW (25% more than the reported EE peak demand savings of 111.9 MW in 2015) and a peak demand reduction capability from DR and load management programs of 38.2 MW in 2017 (30% more than the reported demand response capability of 29.4 MW in 2015).

The EE Rules require that the Company's Plan include a description of APS's compliance with the requirements of the EE Rules for the previous calendar year.[4] APS's DSM program results for 2015 are fully described and documented in the Company's Demand Side Management Annual Progress Report ("2015 DSM APR"), which APS filed with the Commission on March

[4] A.A.C. R14-2-2405(B).

1, 2016.[5] The Annual Progress Report with results from 2016 is currently being developed and will be filed by March 1, 2017.

Prior to the original filing, APS discussed this Plan with various members of the DSM Collaborative group whose membership includes EE experts and stakeholder representatives, as well as Commission Staff.

III. Demand Side Management Portfolio

APS estimates the 2017 DSM Portfolio will produce first year savings of 562,000 MWhs of energy from the measures installed during 2017. These savings, together with the savings estimated to be achieved from measures installed in 2011 through 2016, are equal to approximately 14.0% of APS's estimated 2016 retail sales. In addition, APS estimates that the portfolio will provide 141.2 MW in peak demand reductions from EE programs in 2017. This is a 26% increase above the reported 111.9 MW of peak demand reductions from EE programs in 2015, which achieves the 25% increase in EE peak demand savings as ordered in Decision No. 75679.

APS's existing DSM program portfolio includes the following programs (For more information see the Description of Previously Approved Programs in Appendix B):

Residential Programs

(1) Consumer Products;
(2) Existing Homes HVAC;
(3) Home Performance with ENERGY STAR;
(4) Residential New Construction;
(5) Low Income Weatherization;
(6) Conservation Behavior;
(7) Multi-Family Energy Efficiency;

Non-Residential Programs (Solutions for Business)

(1) Large Existing Facilities;
(2) New Construction and Renovation;
(3) Small Business;
(4) Schools; and
(5) Energy Information Services

Energy Savings Initiatives

(1) Building Codes and Appliance Standards;
(2) APS System Savings

APS intends to continue the already approved programs which were approved in the most recent DSM Implementation Plan.[6] APS also intends to complete the Schools Pilot Program in 2017 as

[5] *See* Docket No. E-00000U-15-0553
[6] Decision No. 75679 (August 5, 2016).

ordered in Decision No. 75323 (November 25, 2015). This Plan addresses the new or expanded measures and the new pilot programs.

A. RESIDENTIAL EE PROGRAMS

1. Previously Approved Residential Programs

APS is not proposing any modifications or new measures to the programs listed below:

(1) Existing Homes HVAC Program
(2) Home Performance with ENERGY STAR
(3) Conservation Behavior Program
(4) Limited Income Weatherization Program
(5) Multifamily Energy Efficiency Program

2. Termination and Modification

a. Terminate Measure: Compact Fluorescent Lamps (CFLs)

APS proposes to terminate CFLs as a measure in all Residential Program where they were previously approved and cease offering incentives for CFLs starting January 1, 2017. While CFLs may offer cost effective savings, they are no longer the most energy efficient or cost effective option for customers looking for new lighting due to the continued advancements of LED lighting technology. Today's LEDs offer better light quality, longer life, better control and dimming ability, safer operation and disposal, and greater energy savings than CFLs making them a better choice for incentives. In addition, LED prices have decreased substantially in the past year and with new lower priced ENERGY STAR rated 'value LEDs' now becoming available, the prices are continuing to decline. Earlier this year, GE signaled that it will stop making CFLs in 2017 due to declining market interest in the bulbs. For these reasons, APS proposes to terminate CFLs as a measure starting in 2017 and cease offering incentives on CFL bulbs at retail locations and no longer offer CFL giveaway bulbs in all programs after existing supplies are depleted. APS has provided increased funding for LED bulb incentives in the 2017 Plan in anticipation of greater demand for these bulbs.

b. Program Modification: Residential New Construction Incentive Structure

APS proposes to modify the qualification requirements and incentive structure of the APS ENERGY STAR new homes program in response to increasingly stringent building codes throughout the state. Many municipalities throughout the state have adopted the 2012 International Energy Conservation Code (IECC) and some cities have started to adopt the 2015 IECC. These codes are more stringent than earlier codes and as compliance with these new codes increases, the APS ENERGY STAR homes program requirements need to be increased to maintain program savings levels above the code.

Therefore, APS proposes to increase the energy efficiency qualification requirements for the program to the following levels:

- All homes must meet all of the current requirements for the EPA ENERGY STAR Homes program at the time of construction and receive certification as EPA ENERGY STAR Homes.
    - All homes in DOE Zone 2 (Phoenix metro, Yuma) must meet a maximum Home Energy Rating System (HERS) score of 65 or less.

- All homes in DOE Zones 4 and 5 (Prescott, Flagstaff) must meet a maximum Home Energy Rating System (HERS) score of 70 or less.
- All homes must include Wi-Fi enabled smart thermostats to control the home's HVAC equipment.

APS proposes to change the program incentive structure as follows:

- Participating homes that meet all minimum program requirements as outlined above are eligible to receive a builder incentive of $500 and a HERS rater incentive of $50 per home.
- Builders who install additional energy efficiency measures at the time of construction to achieve a HERS rating of 60 or less are eligible to receive a builder incentive of $1200 and a HERS rater incentive of $50 per home.

The program achieves a benefit to cost ratio of 1.12 using ACC Staff methodology.

B. NON-RESIDENTIAL EE PROGRAMS

1. Previously Approved Non-Residential EE Programs

APS has five Non-Residential Programs that are marketed under the trade name APS Solutions for Business: Large Existing Facilities Program; New Construction and Renovation Program; Small Business Program; Schools Program; and Energy Information Services Program.

2. Additions, Modifications and Terminations.

a. Discontinue Incentives for Fluorescent Lighting Technologies:

For 2017, APS proposes to terminate incentives for premium T8 and CFL fluorescent lighting technologies. This change will provide more opportunities to expand the more efficient LED options that now exist.

The fluorescent lamps that will be discontinued include:

- Screw-in CFLs
- Hardwired CFLs
- Cold Cathode
- Premium T8/T5 linear fluorescent lamps
- T8/T5 linear fluorescent lamps High Bay

b. Addition of New Prescriptive Measures for LED and Conservation Behavior

Outdoor Lighting: The LED lighting technology saves energy and replacement costs on outdoor lighting systems. APS customers have recently been investigating and adding high efficiency outdoor lighting to the exterior of their buildings and parking lots. The Solutions for Business program currently has evaluated and paid custom incentives for these high efficiency lighting applications. APS proposes to add a prescriptive incentive that will pay $90 per lamp. The outdoor LED lighting measure yields energy savings and is cost effective.

The measure achieves a benefit to cost ratio of 1.53 using ACC Staff methodology.

Street Lighting: Similar to the LED outdoor lighting measure, LED street lighting also saves substantial energy. APS is proposing to include 3rd party owned (such as municipalities) LED street lighting in the Solutions for Business Program as a prescriptive measure. LED street lighting yields cost effective energy savings. It has been extensively evaluated and custom incentives have been paid for high efficiency street light applications. APS proposes to add a prescriptive incentive that will pay $120 per fixture.

The measure achieves a benefit to cost ratio of 1.03 using ACC Staff methodology.

Conservation Behavior Measure: The Non-Residential Conservation Behavior measure provides owners, employees, and other participating individuals of facilities with periodic reports containing information designed to help motivate them to adopt energy conservation behaviors at their workplace.

APS intends to use a number of tactics to encourage conservation behavior in the workplace. One approach, similar to the Residential Conservation Behavior program, will provide direct-mailed reports to small business participants that show how the energy usage in their facilities compares with similar businesses. In addition to providing these benchmarks, the reports will also highlight energy efficiency measures and actions that participants can take to improve the energy efficiency at their business. These tips serve as an energy conservation idea list and education tool to encourage behavioral changes.

The estimated savings from the conservation behavior measure are based on results from similar non-residential behavioral programs in other areas.

The measure achieves a benefit to cost ratio of 3.58 using ACC Staff methodology.

c. Modifications to the Energy Information Services Program

Energy Information Services: This Plan proposes to increase the Energy Information Services (EIS) incentive. EIS software provides Non-Residential customers a convenient analysis tool to view their energy use and demand across multiple facilities or sub-metered end-use loads. This information helps them make changes in their operations to maximize energy and demand savings.

The Solutions for Business program currently covers 75% of the incremental cost to set up and maintain EIS for the first year of services. This incentive is paid on meters having a peak monthly billed demand over 100 kW. The EIS customer incentive cap is $12,000 per customer per year. This first year cost for EIS is typically $240 per participating meter, and the current incentive amount is $180 per meter, leaving a customer cost of $60 per meter.

APS proposes to increase the EIS incentive to 100% of the first year incremental cost (incentive equal to $240 per meter). In this proposed plan, customers will pay for future year EIS subscription at a rate of $240 per meter per year. Customers that actively use EIS can realize savings that far exceed this annual subscription rate. The 100 kW requirement and the incentive cap of $12,000 per customer per year will remain unchanged.

C. DEMAND RESPONSE AND LOAD MANAGEMENT PROGRAMS

APS proposes to continue current demand response and load management programs including the APS Peak Solutions® program, Peak Event Pricing, and Time-of-Use Rates. APS plans to meet at least 10% of the overall 2017 DSM energy savings goal from DR programs.

In addition, Decision No. 75679 ordered APS to propose a new residential demand response or load management program and to increase peak demand capabilities from demand response programs by 30% in 2017 as compared to 2015 reported peak demand savings from demand response and load management programs. APS filed the residential Demand Response, Energy Storage and Load Management (DRESLM) Program on December 5, 2016. The program is designed to facilitate demand response, peak demand management and load shifting technologies to provide an estimated increase of 13.2 MW of demand response capability in 2017, which is 30% higher than the 2015 reported results. See Appendix D for a copy of the Demand Response, Energy Storage and Load Management Program plan (filed December 5, 2016).

Pending Commission approval, APS plans to implement the Demand Response, Energy Storage and Load Management program in 2017 as ordered by Decision No. 75679. However, APS is currently not able to count the program's savings towards compliance with annual DSM goals in 2017, due to having already reached the 10% cap on savings from demand response programs as filed in the initial 2017 DSM Plan. In this 2017 DSM Plan Re-Filing, APS requests Commission approval to count the incremental demand response savings from the DRESLM program that were ordered by Decision No. 75679 towards 2017 savings goals in addition to the 56,200 MWhs of demand response savings in the initial 2017 DSM Plan. APS forecasts that the DRESLM program could provide up to 58,000 MWhs of incremental demand response savings in 2017.

D. OTHER DSM INITIATIVES

1. 2017 System Savings Projects

APS proposes the following System Savings Projects in 2017:

- Upgrades to selected APS-owned community streetlights throughout the APS service territory;
- Operation of Conservation Voltage Reduction systems on an estimated 31 distribution feeders throughout the APS service territory in 2017;
- Energy efficiency upgrades to APS facilities that are the same as measures in the Solutions for Business program, including LED lighting upgrades, installation of new Energy Management System controls, new higher efficiency HVAC air handlers, approximately 55 package HVAC unit replacements, and installation of variable frequency drives.

APS intends to count towards the EES, an estimated 20,000 MWhs of annual energy savings from APS System Savings projects in 2017.

2. Building Codes and Appliance Standards

The Building Codes and Appliance Standards ("C&S") Initiative encourages energy savings by supporting better compliance with energy codes and appliance standards in jurisdictions throughout the APS service area by working with code officials, building professionals and other market actors to develop strategies for achieving better code compliance more cost effectively. In 2017, APS intends to continue current program efforts and tracking codes and standards related savings. APS estimates 40,500 MWhs of savings from the Energy Codes and Appliance Standards initiative in 2017.

3. DSM Pilot Programs

APS is introducing three new DSM pilot programs in 2017 to begin moving programs to align with changing resource needs and market trends: 1) the Energy and Demand Management Education pilot, 2) the T&D pilot, and 3) the Load Management Technologies pilot.

In the 2017 Plan, APS is requesting approval for the Energy and Demand Management Education Pilot to be funded from the DSM budget, and will fund the two additional pilots outside of the DSM budget, and therefore is not requesting approval in this plan. APS will work with a third party to conduct independent evaluation of the savings and cost effectiveness of all three pilots. APS will measure and report savings for all the pilots, and intends to count verified energy savings from all the pilots towards compliance with the EES.

a. Energy and Demand Management Education Pilot

New energy information tools and resources can provide customers enhanced feedback to help better manage their energy use and demand. These tools can help educate customers about the ways that they use energy and point out opportunities for savings. The result is a more informed consumer who better understands how to manage their energy use and demand, improve efficiency and save energy costs.

The program will pilot new energy information tools including web based energy and demand analyzers, personalized videos to guide customers through targeted savings opportunities that match their usage profiles, and an enhanced mobile phone app that can provide near real time feedback on a home's demand and energy use.

A key objective of the pilot will be to measure the energy efficiency savings that result from behavioral changes in energy use that occur when customers receive enhanced energy information. This is in accordance with R14-2-2412(F) of the Arizona Energy Efficiency Rules (EE Rules) which states that, "[e]ducational programs shall be analyzed for cost effectiveness based on estimated energy and peak demand savings resulting from increased awareness about energy use and opportunities for saving energy." The data gathered from the pilot will be used to inform future program planning efforts. A detailed discussion of the Energy and Demand Management Education Pilot is contained in Appendix C.

b. Transmission & Distribution Pilot

R14-2-2412(C) of the EE Rules states that "[t]he analysis of a DSM program's or measure's cost effectiveness may include costs and benefits associated with reliability, improved system operations, environmental impacts, and customer service." This pilot seeks to better understand the potential benefits of concentrating the installation of DSM measures at multiple customer

sites served by the same constrained substation as a method to reduce or defer distribution system capital investments.

This pilot will be targeted to reach both residential and non-residential customers who are served by substations that are facing future capacity constraints due to projected load growth. It will deploy currently approved measures that have been found to be cost effective by ACC Staff. The pilot seeks to enhance the benefits that these measures provide by targeting them to areas where they have the most value in helping to reduce or defer T&D infrastructure costs. Therefore, it is expected that the pilot will produce incrementally higher cost effectiveness results as compared to the same DSM measures installed elsewhere on the system.

The pilot will provide information on benefits from improved system operations that may be gained by targeting demand side management opportunities at the substation level. Data will be collected to measure the reliability of the resulting load reduction impacts compared to planning estimates at the substation level to assist in future planning efforts. The results of the DSM pilot will be compared and measured against the anticipated load on the substation and traditional 'wires alternative' capital construction projects that would have been needed to serve the predicted capacity. Data on total project cost and performance will be used to compare the costs and benefits of the DSM solution to the traditional wires alternative. APS intends to track and report the pilot project cost and benefits to determine the incremental cost effectiveness value that can be gained with this targeted approach.

c. Load Management Technologies Pilot

The increasing market penetration of rooftop solar has created rapidly changing system load shapes and a need for more flexible energy resources as a backup for intermittent solar generation. Demand Side Management opportunities such as load control, demand management, and load shifting can help meet these resource needs by limiting peak demand and shifting energy use to lower demand periods – providing DSM benefits and allowing better integration of rooftop solar on the grid. These types of DSM opportunities are included in the EE Rules; R14-2-2401(13) defines a DSM measure as " any material, device, technology, educational program, pricing option, practice, or facility alteration designed to result in reduced peak demand, increased energy efficiency, or shifting of electricity consumption to off-peak periods. . .".

The pilot will deploy commercially available load control and load shifting technologies for residential and non-residential customers. The pilot will focus on understanding the potential benefits of these technologies in meeting APS' flexible resource needs. APS will field test the value of select utility controlled and/or price responsive load management technologies to gather data on energy and demand savings, reliability of load reductions, and systems operations benefits.

APS will implement the load management pilot program as an extension of current DSM program implementation efforts. Load management technologies for non-residential customers will be promoted and implemented through the Solutions for Business program. Technologies for residential customers may be promoted through each of the current APS residential DSM programs including Residential Existing Homes HVAC, Residential New Construction, Home Performance, Consumer Products, Multi-Family, and/or Limited Income Weatherization programs.

Below is a non-exhaustive list of potential technologies that are to be included in the pilot:

- HVAC Thermal Storage
- Connected/Controlled Electric Heat Pump Water Heating
- Home Energy Management Systems
- Connected Pool Pumps
- Advanced Load Controllers

Decision No. 75679 ordered APS to evaluate, consider, and propose the DSM strategies and technologies discussed during the Commission-led technology workshops as long as they are cost-effective and appropriate for the Arizona Public Service Company territory, and to include the findings and results of its analysis in the modified 2017 DSM Plan. The following table provides a list of each of the DSM strategies and technologies from the Commission-led technology workshops and information on results of analysis on each strategy or technology.

DSM Strategy/Technology	**Results and Status in 2017 DSM Plan**
Behavioral Energy Efficiency	APS currently implements the Conservation Behavior program. Estimated program results for 2017 are included in Table 5 and in backup work papers.
Demand Response	APS currently implements the Peak Solutions program, and proposed the residential Demand Response, Energy Storage and Load Management program on December 5, 2016. Estimated program results for 2017 are included in Table 5, in Appendix D, and in backup work papers.
Demand Response w/Behavior	APS began implementing Behavioral Demand Response with residential customers in 2016 as part of the Conservation Behavior program. Estimated program results for 2017 are included in Table 5 and in backup work papers.
Combined Heat and Power	APS currently considers any Combined Heat and Power projects as a custom measure within the Solutions for Business Non-Residential programs. Although the measure is available in 2017, APS does not anticipate any specific Combined Heat and Power projects in 2017.
Strategic Energy Management	APS does not currently implement a specific Strategic Energy Management program. However, APS implements many of the same technologies and strategies that are deployed in a Strategic Energy Management program including: baseline measurement, providing sub-metered data (through the Energy Information Services program), continuous improvement, and retro-commissioning. Forecasted results of these strategies and technologies are included in Table 5 and in backup work papers.
Conservation Voltage Reduction	APS currently implements Conservation Voltage Reduction

	on 11 distribution feeders. Estimated program results for 2017 are included in Table 5 and in backup work papers.
Integrated Energy Efficiency	APS currently implements all DSM programs with an integrated strategy. In addition, the Demand Response, Energy Storage and Load Management program filed on December 5, 2016 is designed to further enhance integrated energy efficiency offerings such as smart thermostats and grid connected heat pump water heating. Estimated program results for 2017 are included in Appendix D.
Smart Thermostats	APS began implementing smart thermostats as a measure within the Consumer Products program in 2016. In addition, the Demand Response, Energy Storage and Load Management program filed on December 5, 2016 proposed a smart thermostat demand response and load management program. Estimated program results for 2017 are included in Table 5, Appendix D, and in backup work papers.
Residential Energy Automation	APS filed the Load Management Technologies pilot on June 1, 2016 in the initial 2017 DSM Plan, which includes home energy management systems, advanced load controllers, and connected pool pumps. Estimated program results for 2017 are included in Table 5 and in backup work papers.
Enhanced Analytics	APS is currently working with First Fuel to conduct enhanced analytics as part of the Solutions for Business program. No program results are specifically attributed to this strategy, but it is being used to assess the impact of enhanced analytics on program participation, energy savings, and program costs through several customer segments within the Non-Residential programs.

In this 2017 DSM Implementation Plan, APS is either currently implementing or requesting approval to implement nine of the ten strategies/technologies that were discussed in the Commission-led technology workshops. For the one strategy that APS is not currently implementing (Strategic Energy Management), APS is currently offering a similar program concept through the Energy Information Services (EIS) program.

IV. Budget

A. DSM BUDGET

Table 2 (below) shows the anticipated 2017 DSM spending by program. The budget in this Plan represents the estimated spending required to meet the 2017 DSM savings goal of 562,000 MWh, and the requirements resulting from Decision No. 75679. These projections are based on APS's best estimates of market penetration for each program measure. Table 2 includes the anticipated budget by program, broken down by spending category.

Table 2
Estimated 2017 DSM Spending by Program

Program	Rebates and Incentives ($)	Training & Technical Assistance ($)	Consumer Education ($)	Program Implementation ($)	Program Marketing ($)	Planning and Administration ($)	Financing ($)	Total Program Cost ($)
RESIDENTIAL								
Consumer Products Program	$3,865,000	$32,000	$0	$2,500,000	$650,000	$550,000	$0	$7,597,000
Home Performance with ENERGY STAR	$1,724,000	$2,000	$0	$1,039,000	$70,000	$100,000	$2,000	$2,937,000
Limited Income Weatherization	$2,275,546	$15,000	$25,000	$50,000	$35,000	$78,000	$0	$2,478,546
Multifamily	$732,600	$0	$0	$856,000	$30,000	$100,000	$0	$1,718,600
Residential Behavior	$0	$0	$0	$1,547,210	$0	$80,000	$0	$1,627,210
Residential HVAC	$3,826,500	$150,000	$0	$1,533,000	$210,000	$366,000	$0	$6,085,500
Residential New Construction	$3,250,000	$100,000	$0	$325,000	$225,000	$470,000	$0	$4,370,000
Totals for Residential	**$15,673,646**	**$299,000**	**$25,000**	**$7,850,210**	**$1,220,000**	**$1,744,000**	**$2,000**	**$26,813,856**
NON-RESIDENTIAL								
EIS	$54,600	$5,000	$0	$24,000	$3,000	$2,000	$0	$88,600
Large Existing	$13,520,637	$275,000	$25,000	$4,565,000	$1,000,000	$450,000	$0	$19,835,637
New Construction	$2,570,633	$50,000	$5,000	$408,000	$20,000	$70,000	$0	$3,123,633
Schools	$1,316,865	$20,000	$5,000	$640,000	$30,000	$80,000	$0	$2,091,865
Small Business	$1,166,069	$50,000	$5,000	$630,000	$200,000	$98,000	$0	$2,149,069
Totals for Non-Residential	**$18,628,803**	**$400,000**	**$40,000**	**$6,267,000**	**$1,253,000**	**$700,000**	**$0**	**$27,288,803**
ENERGY SAVINGS INITIATIVES								
Codes and Standards	$0	$0	$0	$150,000	$0	$0	$0	$150,000
Energy and Demand Education Pilot	$150,000	$0	$400,000	$300,000	$100,000	$50,000	$0	$1,000,000
Demand Response Program	$0	$0	$0	$2,100,000	$0	$0	$0	$2,100,000
System Savings	$0	$0	$0	$0	$0	$0	$0	$0
Load Management Tech Pilot	$0	$0	$0	$0	$0	$0	$0	$0
T&D Pilot	$0	$0	$0	$0	$0	$0	$0	$0
DR, Storage, and LM Program	$2,285,000	$80,000	$75,000	$1,100,000	$200,000	$260,000	$0	$4,000,000
Totals for Energy Savings Initiatives	**$2,435,000**	**$80,000**	**$475,000**	**$3,650,000**	**$300,000**	**$310,000**	**$0**	**$7,250,000**
Segment Totals	**$36,737,449**	**$779,000**	**$540,000**	**$17,767,210**	**$2,773,000**	**$2,754,000**	**$2,000**	**$61,352,659**

Program Costs	$61,352,659
Measurement, Eval & Research	$2,200,000
Performance Incentive	$3,075,601
TOTAL	$66,628,260

B. DEMAND SIDE MANAGEMENT ADJUSTMENT CHARGE

APS is proposing no change to the current DSMAC charges, which are currently set at $0.001845 per kWh and $0.696 per kW. Table 3 below shows the 2017 revenue requirements for the DSM Adjustor Charge.

APS currently estimates a balance of $24,000,000 in the DSMAC balancing account at the end of the 2016/2017 DSMAC collection year (February 28, 2017). In accordance with Decision No. 75679, APS intends to fund the proposed residential Demand Response, Energy Storage and Load Management program in 2017 with up to $4 million of collected, but unspent funds, from the DSMAC balancing account.

Table 3 - 2017 Revenue Requirements for DSMAC

Total 2017 DSM Budget	$66,628,260
Amount Recovered in Base Rates[7]	($10,000,000)
Collected but Unspent Funds	($4,000,000)
Subtotal	$52,628,260
Less Gain on Sale of Assets Balance	($0)
Total Revenue Requirement for 2017 DSMAC	$52,628,260

C. PERFORMANCE INCENTIVE

The Performance Incentive is an important tool that provides an incentive to encourage and reward exemplary performance in meeting or exceeding the MWh savings goal. The current Performance Incentive structure was approved in Decision No. 74406. The Performance Incentive is earned based on the amount of energy saved and the amount of customer net benefits (total program benefits minus total program costs) generated by the portfolio, as shown in Table 4. The 2017 Performance Incentive calculation does not include any net benefits generated by Codes and Standards, APS System Savings, Demand Response or Pilot Programs. Table 4 shows how the estimated performance incentive for 2017 of $3,075,601 is calculated.

[7] On June 1, 2016, APS filed a general rate case. *See* Docket No. E-01345A-16-0036. In its application, APS requests to increase the amount of funds for DSM that are collected from base rates from $10 million per year to $20 million per year. This request does not increase the total amount requested for DSM, but shifts $10 million from the DSMAC adjustor to base rates. If this request is granted, the amount to be collected through the DSMAC could decrease.

Table 4
2017 Estimated Performance Incentive

Achievement Relative to DSM Goal	Performance Incentive (% of Net Benefits)	Performance Incentive Cap ($0.0125 per kWh saved)
96% to 105%	7%	562,100,000 kWh x $0.0125
Net Benefits (Prior to PI, Codes & Standards, System Savings)	$43,937,157	
Performance Incentive	$3,075,601	$7,026,250

Notes:

[1]The Performance Incentive methodology/calculation was approved in Decision No. 69663 and was modified in Decision No. 71448 and Decision No. 74406.

V. DSM Energy Savings and Benefits

Table 5 provides details of the expected annual and lifetime energy savings and peak demand savings from each DSM program and energy savings initiative and a summary of the net benefits generated for 2017. These are in addition to energy savings, costs and net benefits associated with APS DSM activities undertaken during the 2005 through 2016 timeframe, which are reported each year in APS's Semi-Annual DSM Report filings. The lifetime energy savings are the estimated savings that will result over the expected lifetime of all program measures installed in 2017.

Table 5
2017 DSM Savings and Benefits

Program	Annual Coincident Demand Savings at Generator	Annual Savings at Generator (MWh)	Lifetime Energy Savings (MWh)	Cost Test Benefits ($)	Cost Test Costs ($)	Lifetime Net Benefits ($)
RESIDENTIAL						
Consumer Products Program	15.2	101,272	1,053,336	39,073,753	17,021,117	22,052,636
Home Performance with ENERGY STAR	3.9	8,267	107,016	5,222,956	4,903,333	319,624
Limited Income Weatherization	0.7	1,431	25,751	970,640	970,640	0
Multifamily	1.5	8,607	120,361	4,909,648	3,048,659	1,860,989
Residential Behavior	23.5	67,519	67,519	1,867,183	1,652,190	214,993
Residential HVAC	10.7	15,031	172,370	8,300,888	8,014,485	286,404
Residential New Construction	5.2	10,899	217,983	9,094,747	8,144,646	950,101
Totals for Residential	**60.8**	**213,027**	**1,764,336**	**69,439,815**	**43,755,068**	**25,684,747**
NON-RESIDENTIAL						
EIS	5.7	84	421	450,025	241,929	208,096
Large Existing	36.9	164,975	2,198,064	65,059,295	53,394,858	11,664,437
New Construction	7.5	29,713	413,059	12,075,746	7,655,693	4,420,053
Schools	3.4	15,541	224,056	6,346,123	5,211,748	1,134,375
Small Business	4.4	17,527	200,132	6,414,181	5,588,732	825,449
Totals for Non-Residential	**57.8**	**227,840**	**3,035,733**	**90,345,370**	**72,092,960**	**18,252,410**
ENERGY SAVINGS INITIATIVES						
Codes and Standards	11.9	40,566	0			
Energy and Demand Education Pilot	2.4	3,328	3,328			
Demand Response Program	0.0	56,200	0			
System Savings	6.9	20,000	200,876			
Load Management Pilot	1.3	1,168	14,174			
T&D Pilot	0.0	0	0			
Totals for Energy Savings Initiatives	**22.5**	**121,262**	**218,378**	**0**	**0**	**0**
TOTAL	**141.2**	**562,129**	**5,018,447**	**159,785,184**	**115,848,028**	**43,937,157**

Appendix A

Comparison of Benefit-to-Cost Ratios -- Alternative Scenarios

		A	B	C	D	E
	Program	ACC Staff Methodology WACC=7.2%; Non-Levelized Capacity	ACC Staff Methodology; Societal=2.0%; Non-Levelized Capacity	ACC Staff Methodology; WACC=7.2%; Levelized Capacity	ACC Staff Methodology; Societal=2.0%; Levelized capacity	Alternative Hourly Method; Societal=2.0%; Levelized capacity; Hourly energy
1	Consumer Products Program	2.30	2.60	2.35	2.89	3.74
2	Residential HVAC	1.04	1.10	1.10	1.48	1.63
3	Home Performance with ENERGY STAR	1.07	1.30	1.15	1.68	1.92
4	Residential New Construction	1.12	1.42	1.21	1.85	2.16
5	Residential Behavior	1.13	1.13	1.25	1.26	1.23
6	Multifamily	1.61	1.94	1.67	2.21	2.65
7	Limited Income Weatherization	1.00	1.00	1.00	1.00	1.00
8	Non-Res Large Existing	1.22	1.44	1.27	1.70	1.98
9	Non-Res New Construction	1.58	1.87	1.65	2.26	2.76
10	Non-Res Small Business	1.15	1.34	1.20	1.61	1.84
11	Non-Res Schools	1.22	1.47	1.27	1.76	2.08
12	Non-Res EIS	1.86	1.51	2.51	2.95	3.51
13	Energy & Demand Mgmt Education Pilot	0.11	0.11	0.13	0.13	0.13
14	Load Mgmt Technologies Pilot	0.38	0.38	0.40	0.54	0.56
	Total Portfolio	**1.35**	**1.57**	**1.41**	**1.87**	**2.18**

Column A: ACC Staff methodology; Weighted average cost of capital (WACC) discount rate of 7.20%;
Non-levelized avoided cost of capacity.
Column A was used to screen programs/measures for the 2017 DSM Plan.

Column B: ACC Staff methodology; Societal discount rate of 2.0%;
Non-levelized avoided cost of capacity.

Column C: ACC Staff methodology; Weighted average cost of capital (WACC) discount rate of 7.20%;
Levelized avoided cost of capacity.

Column D: ACC Staff methodology ; Societal discount rate of 2.0%;
Levelized avoided cost of capacity.

Column E: Alternative methodology (using hourly energy savings load shapes); Societal discount rate of 2.0%;
Levelized avoided cost of capacity; hourly energy avoided costs.

Appendix B
Description of Previously Approved DSM Programs

RESIDENTIAL PROGRAMS

1. Consumer Products Program

The primary target market for the Consumer Products program is APS residential customers who are contemplating the purchase of energy-using products for their homes. The program provides customers with education and incentives to purchase products, such as light bulbs, pool pumps and other consumer products that use less energy. APS implements the program through participating retailers within the APS service territory.

The lighting element of the Consumer Products program promotes high-efficiency Environmental Protection Agency (EPA)/Department of Energy (DOE) ENERGY STAR® approved lighting. APS solicits discount pricing from compact fluorescent lamp (CFL) and light emitting diodes (LED) manufacturers and distributes bulbs through local retailers. Customers are referred to participating retailers to purchase qualifying products. Discount pricing is passed on to consumers through a negotiated agreement with lighting manufacturers and retailers. The program also provides sales training for participating retailers and consumer education, including in-store point-of-sale displays.

The pools element of the Consumer Products program promotes ENERGY STAR® qualified energy efficient variable-speed pool pumps to residential pool owners providing customers with significant cost effective savings. The program provides incentives to consumers, retailers, and installers to help overcome the higher initial cost of these pool products and to promote their increased adoption in the market place.

2. Existing Homes HVAC Program

The Residential Existing Homes Program Heating, Ventilation, and Air Conditioning (Residential HVAC) measures use a combination of financial incentives, contractor training and consumer education to promote the proper installation and maintenance of energy efficient HVAC systems. The air conditioner (AC) Rebate, Duct Test and Repair, Prescriptive Duct Sealing and HVAC Diagnostics portions of the program include measures supporting energy efficient residential air conditioning and heating systems through the proper installation, maintenance and repair of HVAC systems. This program also provides APS customers with referrals to contractors who meet strict program requirements for professional standards, technician training, and customer satisfaction.

3. Home Performance with ENERGY STAR Program

The Home Performance with ENERGY STAR® (HPwES) program promotes a whole house approach to energy efficiency by offering incentives and financing for improvements to the building envelope of existing residential homes within the APS service territory. The current program includes measures to improve the energy efficiency of the home such as air sealing, insulation, duct sealing, and low flow showerheads. The HPwES program provides APS customers with referrals to specially credentialed contractors who meet strict program requirements for professional standards, technician training, and customer satisfaction.

Appendix B
Description of Previously Approved DSM Programs

4. Residential New Construction Program

The Residential New Construction program promotes high efficiency construction practices for new homes. It offers incentives to builders that meet program EE standards in order to increase the penetration of high efficiency homes. The program emphasizes the "whole building" approach to improving EE and includes field testing of homes to ensure compliance with APS performance standards. Participating builders are trained to apply building science principles to assure that high-efficiency homes also have superior comfort and performance. The program also provides education for prospective homebuyers about the benefits of choosing an energy efficient new home and the features to consider.

5. Limited Income Weatherization Program

APS's Energy Wise Limited Income Weatherization (LIW) Program is designed to improve the energy efficiency, safety, and health attributes of homes occupied by customers whose income falls within 200% of the Federal Poverty Guidelines (FPG). The weatherization component of this program serves low income customers with various home improvement measures, including cooling system repair and replacement, insulation, sunscreens, water heaters, window repairs and improvements, as well as other general household repairs. Non-profit agencies and municipal entities owning and operating low income multifamily housing are also able to benefit from funds set-aside to weatherize their complexes. In addition, there is a Crisis Bill Assistance component serving customers whose income falls below 150% of the FPG. These programs elements are administered by various community action agencies throughout APS's service territory.

6. Conservation Behavior Program

The Residential Conservation Behavior program provides participating residential customers with periodic reports containing information designed to motivate them to adopt energy conservation behaviors. To drive conservation behavior, the program provides direct-mailed reports to participants that show how the energy usage in their homes compares with energy efficient homes and other similar homes. In addition to providing these benchmarks, the reports also highlight energy efficiency measures and actions that participants can take to improve the energy efficiency of their homes. These tips serve as an energy conservation idea list and education tool to encourage behavioral changes. Participants are also encouraged to visit a program web portal for additional information.

7. Multi-Family Energy Efficiency Program

The Multifamily Energy Efficiency Program (MEEP) aims to improve the efficiency of multifamily properties and dormitories by using a comprehensive approach designed to target existing and new construction multifamily buildings.

The MEEP takes a two-track approach to address the challenges of reaching the multifamily market. The first track targets existing multifamily properties by providing retrofit items that include energy efficient CFL and LED light bulbs, showerheads, and faucet aerators to retrofit each dwelling in a community. These measures are provided at no cost to the multifamily community, but must be installed by the facility personnel. In addition, this track works through

the Non-Residential APS Solutions for Business programs to provide energy assessments to assist communities in identifying additional energy saving opportunities and available APS rebates within the multifamily complex but outside of the individual dwelling units (e.g. common area buildings, swimming pools, outdoor lighting, and laundries).

The second track is a new construction/major renovation program that offers a per dwelling incentive for projects that build or renovate to a higher level of energy efficiency. Incentives increase as a higher level of energy efficiency is achieved.

NON-RESIDENTIAL PROGRAMS

1. Large Existing Facilities Program

The primary targets for the Non-Residential Existing Facilities program are customers who have an aggregated monthly peak demand greater than 100 kW. This program provides prescriptive incentives to owners and operators of large Non-Residential facilities for EE improvements in lighting, HVAC, motors, building envelope, and refrigeration measures. Custom incentives are also provided for EE measures not covered by the prescriptive incentives. Incentives are also provided to customers who conduct qualifying energy studies. The largest customers (electric usage > 40,000 MWh per year) may qualify to self-direct the amount they pay toward DSM funds for their own EE projects. All customers may qualify to receive program arranged financing for their EE projects. Customers may participate in the Direct Install (Direct Install can pay up to 90% of project cost) family of measures in the areas of lighting and refrigeration for any facilities with a peak monthly demand of 400 kW and less.

2. New Construction and Renovation Program

The Non-Residential New Construction program includes three components: 1) design assistance; 2) prescriptive measures; and 3) custom efficiency measures. Design assistance involves efforts to integrate energy-efficiency into a customer's design process to influence equipment/systems selection and specification as early in the design process as possible. Prescriptive incentives are available for EE improvements in measures such as lighting, HVAC, motors, building envelope, and refrigeration applications. Whole Building Design is a component within the New Construction custom efficiency measures that influences customers, developers, and design professionals to design, build and invest in higher performing buildings through a stepped performance incentive structure with the financial incentives becoming larger as the building performance improves. The APS Whole Building Design incentives are designed to complement the Leadership in Energy and Environmental Design (LEED) green building certification system which was developed by the United States Green Building Council.

3. Small Business Program

The primary targets for the Small Business Program are customers that have a maximum peak aggregated demand of 100 kW or less. This program provides prescriptive incentives to small business owners for EE improvements in lighting, HVAC, motors, building envelope, and refrigeration applications through a simple and straightforward mechanism. In addition, a customer in the Small Business Program may participate in the Direct Install (Direct Install can

pay up to 90% of project cost) family of measures in the areas of lighting and refrigeration and may also qualify to receive APS arranged program financing for their EE projects. Small Business customers are also eligible to receive incentives for energy studies and custom efficiency measures.

4. Schools Program

This program is designed to set aside funding for K-12 school buildings, including public schools, private schools, and charter schools. If schools fully subscribe this program budget or if they reach their incentive cap of $100,000 per year under this program, they can participate in other Non-Residential programs. EE incentives are the same as the Large Existing Facilities (for existing school facilities) and New Construction (for new school construction and major renovations). In addition, any size school may participate in the Direct Install measure incentives and may also qualify to receive APS arranged program financing for their EE projects.

5. Energy Information Services Program

The Energy Information Services ("EIS") program provides 15-minute interval electric usage data to large Non-residential customers through a web-based energy information tool. This tool provides users with information that can be used to improve or monitor energy usage patterns, reduce energy use, reduce demands during on-peak periods, and to better manage their overall energy operations.

ENERGY SAVINGS INITIATIVES

1. Codes and Standards Initiative

The Energy Codes and Appliance Standards ("C&S") Initiative encourages energy savings by supporting better compliance with energy codes and appliance standards in jurisdictions throughout the APS service area by working with code officials, building professionals and other market actors to develop strategies for achieving better code compliance more cost effectively.

2. Demand Response Programs

APS currently implements several demand response programs and rates that are counted towards annual EES compliance. These include the Peak Solutions demand control program, Critical Peak Pricing rates, and Time of Use rates.

3. APS System Savings Initiative

APS System Savings projects include many of the same types of energy savings measures as those that are being installed at customer sited facilities – but implemented at APS facilities. System Savings projects include but are not limited to APS generation, transmission, distribution, and facilities energy efficiency improvements.

Appendix C
Energy and Demand Management Education Pilot

TABLE OF CONTENTS

Energy and Demand Management Education Pilot

Program Concept and Description
New energy information tools and resources can provide customers enhanced feedback to help better manage their energy use and demand. These tools can help educate customers about the ways that they use energy and point out opportunities for savings. The result is a more informed customer who better understands how to manage their energy use, improve efficiency and save energy costs.

The program will pilot new energy information tools including an enhanced mobile phone app that can provide near real time feedback on a home's demand and energy use, personalized videos that guide customers through targeted savings opportunities that match their usage profiles, and enhanced energy analysis tools available at aps.com.

A key objective of the Pilot will be to measure the energy efficiency savings that result from behavioral changes in energy use that occur when customers receive enhanced energy information. The data gathered from the Pilot will be used to verify and count these savings towards compliance and to inform future program planning efforts.

Target Market
The Energy and Demand Education Pilot will be targeted to reach all customers who are looking for information on their energy use and opportunities to save energy. There will be opportunities for both residential and non-residential customers to participate in Pilot program offerings. Some offerings will be specifically targeted to customers whose usage profile shows the highest potential for cost effective savings opportunities.

Current Baseline Conditions
APS currently provides many tools and resources for customers to help them save energy. The Pilot will add new channels including an expanded mobile phone app, personalized videos, and enhanced energy auditing tools on aps.com. The current baseline condition does not include these new energy information and education tools. The Pilot will provide an enhanced menu of energy use information above the current baseline, and measure the resulting customer experience and energy savings.

Program Eligibility
All customers will be eligible to access general energy information resources. At this time, the expanded mobile app feature will only be available for customers who have electric meters that are compatible with this technology.

Program Rationale and Objectives
The rationale for this Pilot is that there are new energy information tools available that can provide customers with enhanced feedback on their energy use to help them better manage energy costs while driving energy savings and peak demand reductions. The objective of the Pilot is to implement these tools on a limited scale and measure the energy and demand savings that can result.

Program Implementation
APS will implement the Energy and Demand Management Education Pilot as an extension of current program implementation efforts. Energy and demand management education resources will be promoted to customers through current EE programs and customer outreach efforts including customer newsletters, business offices, call center associates, aps.com, social media, direct mail/email and other campaigns.

The key information tools and elements of the Pilot will include the following:

- **Mobile App Energy Management Information and Bridge Device Add-On** – APS recently launched a new mobile phone app, which provides customers with next day feedback on their energy use and demand. Customers can use this information to better manage their use and save energy. A recent study of the DTE Energy Insight App showed that customers who accessed the app saved an average of 1.08% of their annual energy use. This pilot will study and measure the energy and demand savings that APS customers are experiencing. In addition, as an enhancement to the app, customers who purchase an energy bridge gateway device can use it to access near real time information from their meter. DTE offers this enhanced mobile phone app in their Energy Insight program, and customers who used this enhanced app were found to save an additional 3.21% of their annual energy use. In the Pilot, APS intends to study both the app and enhanced app to measure the resulting energy and peak demand savings.

- **Personalized Videos and Outreach Tools** – Personalized videos and other customizable educational tools have great applications for DSM. They provide the ability to personalize and target energy savings information to customers based on their energy profiles and rate plan. APS will pilot these videos to deliver highly actionable information that guides customers to the best energy savings actions that fit their individual needs, and measure the resulting energy and peak demand savings.

- **Enhanced Online Education and Energy Analysis Tools** – APS currently provides an online Energy Analyzer auditing tool that can help residential customers survey their home to find the best opportunities for savings. The Pilot will enhance the current online Energy Analyzer tool with new features to focus on peak demand management, as well as incorporate it into a more comprehensive suite of energy information content. In addition, APS will pilot a new web based energy audit survey tool for Non-Residential customers. The objective will be to create a more comprehensive set of energy analysis tools for both residential and non-residential customers while studying and measuring the resulting energy and peak demand savings.

Incentive Design
Educational tools and resources (including enhanced mobile phone apps, personalized videos, and online content) will be developed with pilot program funding and provided free of charge to participating customers. No other incentives will be provided for these measures. For the enhanced mobile app, customers may need to install additional equipment, such as an energy bridge gateway device at a cost of approximately $100. APS will offer to provide incentives of up to 100% of the cost of such a device up to a $100 maximum incentive for pilot participants.

Delivery Strategy and Administration
APS plans to deliver and administer the Energy and Demand Management Education Pilot in-house with assistance from Implementation and Evaluation contractor partners.

- APS will work with existing DSM implementation contractors and through existing communications channels to promote and implement the Pilot program outreach.
- APS will work with Navigant as a third party evaluation contractor to assist in collecting and analyzing data for the Pilot and measuring the resulting energy savings.

How to Leverage with Existing Programs
The Pilot program will be integrated with current EE program efforts and implemented with assistance from current program implementation contractors, so it will leverage the existing program delivery and evaluation infrastructure.

Marketing and Communications

- The Pilot's program marketing and communications will be integrated with other EE programs, messages and communications channels.
- APS will work with current program implementation contractors to ensure they are familiar with the new educational resources, how to access them, and how to promote their benefits for customers.
- APS will utilize customer communications tools including bill messages/inserts, social media, customer newsletters, earned media and other outreach to promote new educational tools and resources to customers.
- APS will conduct targeted outbound communications to proactively reach customers with the highest potential savings based on their usage profiles.

Program Implementation Schedule
APS will begin implementation of the Energy and Demand Management Education Pilot after ACC approval. APS plans to implement the Pilot using existing program implementation contractors and delivery channels. This will ensure the Pilot is integrated with other DSM opportunities for customers, it leverages other program infrastructure, and that APS can begin offering enhanced education to customers soon after approval.

Measurement, Evaluation and Research Plan
The Measurement, Evaluation, and Research (MER) for this Pilot will measure electric energy and demand reductions and assess customer engagement and satisfaction for pilot

technologies and program delivery. Impacts resulting from Pilot offerings will be evaluated through a statistical comparison of energy consumption data for program participants and a control group. The evaluation will leverage AMI data and customers' monthly billing data to determine energy saving impacts. Customer engagement and program satisfaction will be assessed through participant and non-participant surveys and interviews. Surveys will identify behavioral changes of participants, determine barriers to participation, and quantify program awareness, customer satisfaction, and level of engagement.

Program Budget

The 2017 proposed budget is detailed below.

Table 1 – 2017 Energy and Demand Education Pilot Budget

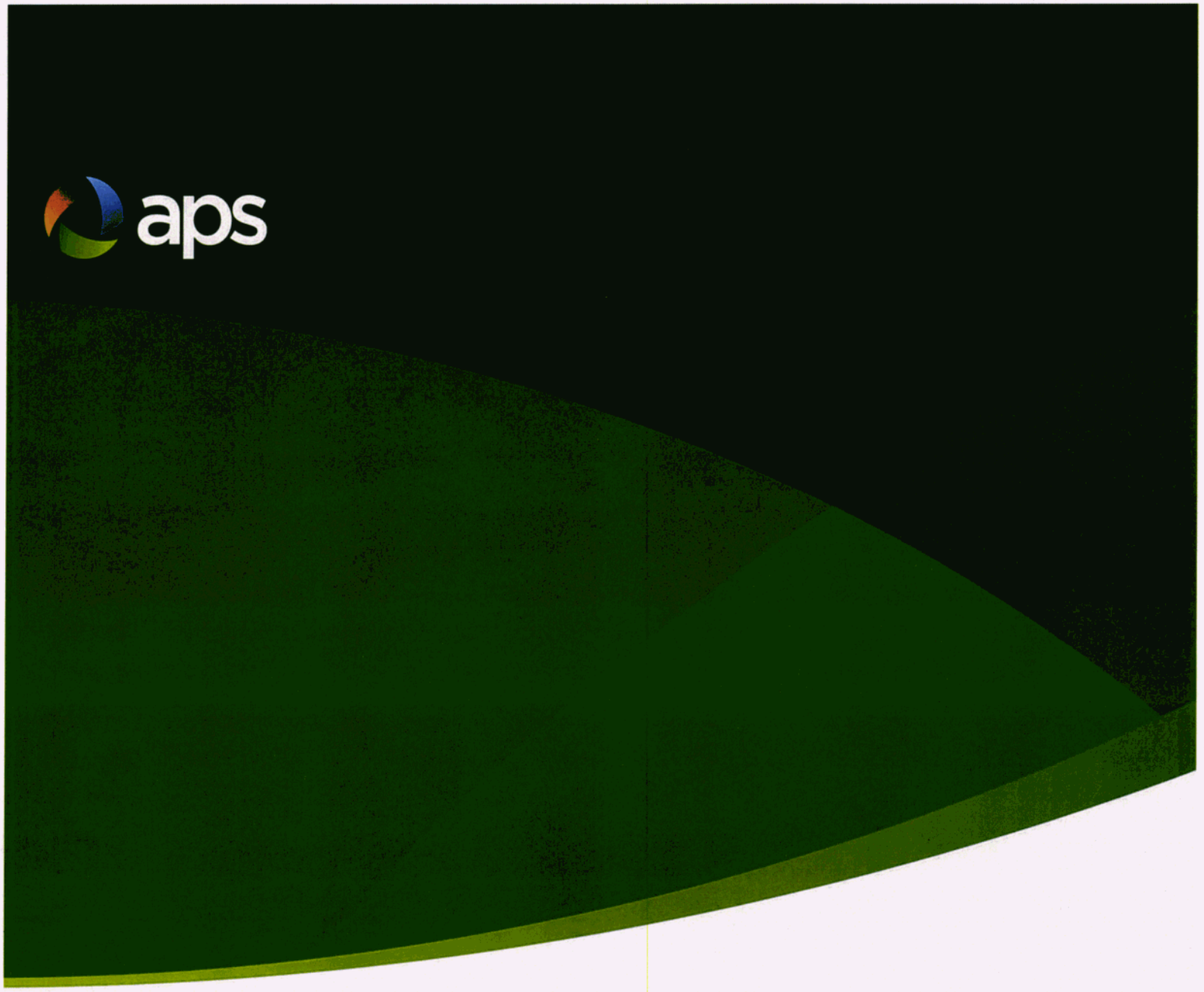
	2017
Rebates and Incentives	$150,000
Training and Technical Assistance	$0
Customer Education	$400,000
Program Implementation	$300,000
Program Marketing	$100,000
Planning and Administration	$50,000
Total	**$1,000,000**

Estimated Energy Savings

The Pilot is currently estimated to provide energy savings of approximately 3300 MWhs annually. This is based on savings results from the DTE Energy Insights program. This is a conservative preliminary savings estimate that does not account for all of the anticipated savings from all measures in the pilot. One key objective of the Pilot will be to refine energy savings estimates based on the data collected.

Cost Effectiveness

APS conducted preliminary cost effectiveness screening on the Pilot using ACC Staff methodology as well as alternative inputs as shown in Appendix A. The Pilot is currently not screening as cost effective using any of the methodologies. This is largely due to three factors: 1) the current estimates of participant savings which are very conservative due to a lack of measured data, 2) the cost of one-time technology set up that is included in the Pilot budget but would not be needed in subsequent years, 3) the small participation volume in the Pilot. Cost effectiveness will improve with better savings estimates and higher volumes of participants that would be expected in a full program implementation. APS will conduct the Pilot and collect data on the resulting energy savings and costs to better inform future cost effectiveness analysis.



Residential Demand Response, Energy Storage and Load Management Program

Docket No. E-01345A-15-0182

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Residential Demand Response, Energy Storage and Load Management Program

Introduction

This program plan is being filed pursuant to Decision No. 75679 which ordered APS to". . . Develop and propose to the Commission, for approval, a residential DR or load management program with a budget cap of up to $4 million, which may be funded with the DSMAC over collection, that facilitates energy storage technology, as discussed herein, within 120 days of the effective date of this Order."

The APS Residential Demand Response, Energy Storage and Load Management (DRESLM) program will deploy commercially available load management and load shifting technologies that have not yet been widely used in Arizona Demand Side Management (DSM) programs. The programs will focus on optimizing the potential benefits of these technologies in helping customers manage peak demand while meeting APS' flexible resource needs.

The increasing market penetration of rooftop solar photovoltaics, or PV, is creating rapidly-changing system load shapes and a need for more flexible resources as a backup for intermittent solar generation. Distributed energy resource opportunities that support load management, demand response, and load shifting through the use of energy storage can help meet these resource needs by limiting peak demand and shifting energy use to midday high rooftop PV solar production periods – providing DSM benefits and allowing better integration of distributed solar generation (DG) on the grid.

Program Concept and Description

The program is designed to support the deployment of residential load management, demand response and energy storage technologies that help APS residential customers shift energy use and manage peak demand while also providing system peak reduction and other grid operational benefits.

The program includes three elements:

1) Battery Storage – Both residential scale (~5 kW) and intermediate scale batteries (~100 - 200 kW) deployed on targeted distribution feeders to

reduce system peak, provide feeder congestion relief, and support integration of distributed energy resources.

2) Thermal Storage – Connected heat pump water heaters with 80 gallon storage capacity tanks to be installed in homes on targeted distribution feeders, designed to reduce system peak and provide load management benefits by shifting water heating demand into the midday peak solar production period.

3) Demand Response - Connected residential smart thermostats that can be controlled to provide demand response load reductions during system peak events, with additional features allowing customers to opt for automatic pre-cooling of their home prior to peak demand periods to maximize comfort.

By including each of the three program elements described above, the DRESLM program will provide valuable information on the relative performance, cost, and use cases for these technologies, while helping APS meet increased demand response compliance goals in 2017 that were ordered in Decision No. 75679 (Docket E-01345A-15-0182).

Target Market

The program will be targeted to reach APS residential customers throughout the APS service territory, with elements of the program focused on specific distribution system feeders to maximize the program's demand management benefits.

The Demand Response element of the program will be available and targeted to all residential customers who have a compatible Wi-Fi enabled smart thermostat – including all customers who participate in the APS smart thermostat energy efficiency (EE) rebate program that was recently introduced.

The Battery Storage and Thermal Storage elements of the program will be focused on targeted distribution feeders where APS has identified opportunities. Residential customers who are served by one of these feeders will be targeted to participate in these elements of the program. By focusing the program primarily on these targeted feeders, it provides an opportunity to increase the benefits that these distributed resources contribute towards managing peak load conditions.

Current Baseline Conditions

Changing system load shapes are causing a greater variation in the value of energy during different times of the day and season. In midday hours during many days of the year, there is an abundance of solar energy on the grid and the value of avoided energy can be negative – which is reducing the value of energy savings from many traditional EE measures. At the same time, the intermittency of solar resources means that there is a higher value in flexible, complementary resources that can help shift energy usage to occur during times of abundant solar supply and away from peak demand periods.

APS estimates that there are currently close to 60,000 residential smart thermostats installed throughout APS territory. APS recently started the smart thermostat EE program for residential customers, offering a $75 rebate towards the purchase of qualifying smart thermostats, which will help to drive additional penetration of this technology. The Demand Response element of the program will leverage the smart thermostat EE program and offer residential customers a participation award in the range of $50/household/year to allow APS to slightly adjust their thermostat settings (typically no more than 2 degrees) during up to 20 peak events during summer months to provide demand savings. Weather is a primary driver of peak load conditions; therefore, direct thermostat control is a simple and effective method of exercising demand response.

Residential battery storage is still an emerging application of storage technology with few residential-scale batteries currently deployed in APS territory. As residential battery technologies continue to decline in cost, their presence in the market should – if coupled with residential rate models that reward the use of storage by accounting for the true cost of service in the form of a demand rate – experience future growth. Thus, it is important to understand the capabilities of residential-scale batteries as an option to resolve feeder peak-load issues and voltage-related problems caused by high-PV penetration at the feeder level. Similarly, intermediate-level storage in the 100 to 200 kW size range also represents a potentially effective means of regulating the same feeder level peak load and voltage regulation issues. Using a combination of both residential and intermediate scale batteries, the DRESLM program will help APS better understand how to manage local feeder power quality and support sustainable solar in Arizona.

Thermal storage is not a new technology, but new models of connected water heaters are emerging that are specifically designed to help utilities shift water heating load by providing additional storage capacity and the ability to remotely control temperature settings. These units can be deployed during the hours of peak midday solar production in the winter to offer a way to flatten out the 'duck curve' load shape. Similar programs have been effectively implemented in Australia and Hawaii.

Program Rationale and Objectives

Changing resource needs require more flexible resource options to firm up intermittent resources like distributed solar. At the same time, emerging distributed energy resource technologies provide new opportunities to help customers shift their energy use and manage peak demand. The objective of the program is to benefit customers by offering opportunities for managing their energy and peak demand, and to expand the use and understanding of residential load-management technologies and their ability to shift loads to better match solar production curves and system peak conditions. The program will encourage the installation of distributed battery storage, thermal storage and demand response technologies and will collect data from each installation to measure load shape impacts and assess the reliability of load reduction. In addition, the demand response capacity that will be installed through the program will help APS meet the increased demand response goals in 2017 that were ordered by the Commission in Decision No. 75679.

Certain elements of the program reference a requirement for the participants to be placed on the APS proposed rate R-3.[1] The on-peak period of 3-8pm is critical to support PV resource integration and battery effectiveness/ride-through during peak periods. Absent an adjusted on-peak period these distributed energy resources will stop mitigating impacts of high penetration PV at the peak of solar production and reduce the impact of battery operation by elongating the period of discharge out of alignment with the system peak. These elements will not go into effect until the conclusion of the APS rate case unless otherwise directed by the Commission.

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[1] APS has requested in its pending rate case, Arizona Corporation Commission Docket No. E-01345A-16-0036, a combined time of use / demand rate identified as rate R-3.

Program Eligibility

Customer participation will be limited to the participation goals established for each program element and subject to the $4 million total program budget in 2017.

For the residential battery storage element of the program, customer eligibility will be limited to approximately 40 to 90 residential customers who own homes, can locate the battery on premise outside of direct peak period sunlight, and are served by one of the distribution feeders that will be targeted for this program. This program element will focus on targeted feeders first but may be expanded to additional feeders as needed to meet participation goals within the allocated budget.

In Decision No. 75679, the Commission indicated that "an advanced rate designed for technology adopters may be needed to ensure a successful program implementation that maximizes benefits to participating customers as well as non-participants." Consistent with Commission direction and to align with effective load management and peak load shaving, all eligible customers for the Battery Storage program element must agree to be placed on the proposed rate R-3 as a requirement for participation.

For the Thermal Storage element of the program, eligibility will be limited to approximately 350 - 450 residential customers and will focus on homes that are served by one of the distribution feeders that will be targeted for this program.[2] All eligible customers must agree to be placed on the proposed rate R-3 as a requirement for participating. Qualifying connected heat pump water heaters must be installed by participating qualified water heating contractors to be eligible for the program. This program element will focus on targeted feeders first but may be expanded to additional feeders as needed to meet participation goals within the allocated budget.

For the Demand Response element of the program, eligibility will be limited to approximately 6,000 connected residential smart thermostats that are capable of being connected to the APS demand response platform (*i.e.*, most major brands including Nest, EcoBee, Honeywell, and others). There are no geographic restrictions for participation within the APS service territory, but

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[2] Distribution feeders are selected based on penetration of PV resources.

APS may choose to offer a higher-value incentive to customers who are served by target feeders to encourage higher participation levels in those areas. Customers will also be encouraged to shift to the proposed rate R-3 f they are interested in optimizing pre-cooling.[3] Pre-cooling the home during off-peak periods will support better demand response, customer comfort, and peak load management. The adjusted tariff will be offered as an option to participating customers, but it is not a participation requirement for this element of the program.

Program Implementation

The residential scale battery systems will be operated to help customers manage peak demand as well as assist, from time to time, in relieving system peak periods. All battery systems will be owned and operated by APS. Batteries will have seasonal controlling logic to support charging during periods of midday solar production in the fall and spring when the duck curve is most prominent. It is expected that the capacity of the batteries to be installed will be a typical residential scale battery ranging from approximately 5 - 7 kW per home.

The intermediate scale battery systems will be owned and operated by APS. They will be in the 100 to 200 kW range, targeted to be installed on the same distribution feeders as the residential scale batteries in the program. These batteries will supplement the residential scale systems to provide meaningful feeder congestion relief, and offer an opportunity to study other potential customer benefits such as voltage optimization and conservation voltage reduction.

Following the useful life of the batteries that APS uses for energy storage, we will look for all opportunities to recycle the spent batteries and any other discarded components. Regardless of the final disposition, however, the spent batteries and other components will be handled in accordance with all applicable environmental requirements.

For the Thermal Storage program element, the water heaters will be installed at APS residential customer homes by qualified local water heating contractors. APS will rebate up to 100% of the installed cost of qualifying

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[3] Pre-cooling is the adjustment of customer thermostat down a few degrees cooler prior to the on-peak period in order to shift load away from during on-peak periods.

water heaters for participating homes served by targeted distribution feeders. APS anticipates that approximately 400 residential customers will be able to participate within the budget for this program element. During implementation, customers will benefit from increased energy efficiency year round from the heat pump water heating technology. APS will also utilize the connected feature of this technology to use excess capacity in the water heater tank as energy storage to be deployed to help reduce demand, flatten duck curve load shapes, and as a quick response flexible load that can react to grid needs.

For the Demand Response program element, APS intends to leverage the current EE program smart thermostat platform to enable and deploy demand response functionality. All residential customers who participate in the EE smart thermostat program, as well as any APS residential customers who own qualifying smart thermostats may be offered participation in this program element. Customers who opt to participate in the program will allow their thermostat settings to be remotely adjusted (typically no more than 2 degrees) during up to approximately 20 peak demand events each summer lasting up to three hours each. Residential customers who opt to participate in the smart thermostat DR program will be paid an annual participation award (estimated at around $50/year, APS may increase the participation award if needed to achieve participation goals and/or encourage greater participation on targeted distribution feeders). Participating customers always retain control of their thermostat and they can override events without any penalties – which leads to higher levels of customer satisfaction and customer retention in programs, while delivering nearly the same level of demand response savings diversified across the participating population of homes.

Participation Award Design

Battery Storage Element

- Although residential customers will not be operating the battery systems, participating customers will benefit from use of the batteries to help manage their demand and save demand charges on their bill, particularly in summer months when customer demand and the potential for saving is highest.
- In addition to the bill savings from usage optimization, APS will pay an award to participating customers. APS may adjust the

participation award if needed to ensure adequate levels of participation on targeted distribution feeders.

- APS also intends to allow customers to use the battery storage systems as a backup power supply during outages if the incremental costs to island the customer are manageable.
- Battery systems will be 100% owned, operated and maintained by APS – all technology purchase, installation and maintenance costs will be paid directly by APS.

Thermal Storage Element

- APS will rebate 100% of the installed cost of qualifying connected heat pump water heaters, installed by participating contractors on APS residential customer homes served by targeted distribution feeders.
- Participating customers will benefit from load shifting of water heating to off-peak periods as well as annual energy and demand savings from the heat pump water heater.
- APS will pay an annual participation award of approximately $50 to customers in exchange for allowing utility control of their water heater. APS may adjust the participation award if needed to meet participation goals on targeted distribution feeders.

Demand Response Element

- APS will pay an annual participation award of approximately $50 per thermostat to participating customers in exchange for allowing utility control of their smart thermostat. APS may adjust the participation award if needed to meet participation goals or target distribution feeders.
- Customers who wish to participate in the Demand Response program element, but who do not currently have a smart thermostat, may participate in the APS smart thermostat EE program to receive up to $75 off the purchase price of a qualifying smart thermostat, which could then be enrolled in the Demand Response program element.

Delivery Strategy and Administration

APS will deliver and administer the program in-house. APS will solicit proposals from qualified vendors to assist in technology deployment and

management, as well as leveraging existing DSM program infrastructure and implementation platforms.

Leverage Existing Programs

APS will leverage the current smart thermostat residential EE program to market and deliver the demand response program element to customers.

Marketing and Communications

For the Battery Storage and Thermal Storage program elements, APS will conduct targeted marketing to potential participants that are located on targeted distribution feeders. Marketing will consist of direct mail, email, and other targeted recruiting promotions. APS will budget to maintain participant communication throughout the program life to ensure customer education and satisfaction are maintained throughout.

For the Demand Response program element, APS will work with the demand response program platform provider to coordinate marketing promotions with smart thermostat manufacturers. When eligible APS customers log into their smart thermostat online platform, they will receive a message to promote participation in the APS program. This direct marketing platform allows APS to target potential participants directly, and makes it easy for customers to enroll in the APS demand response program. The program will also be collaboratively marketed with the APS smart thermostat EE program. Because this element of the program will be available for up to 6,000+ participants and does not need to be geotargeted, it may also be marketed through APS newsletters and other customer information outreach tools.

Program Implementation Schedule

Upon Commission approval of the program, APS will solicit proposals from qualified firms, select vendors, and finalize program details. APS anticipates that some elements of the program, such as demand response smart thermostats, could be rolled out to customers within 90 days from Commission approval. Assuming approval for the overall program in early 2017, this would provide enough time to recruit and enroll customers in some elements of the program in advance of the summer peak demand season. Battery and thermal storage elements will align to the

Commission's determination of a modified on-peak period due to the limitations of existing on-peak time periods to accomplish program goals – these timelines are subject to change based on a number of factors including testing of the technology and verification of safety credentials.

Measurement, Evaluation and Research Plan

The Battery Storage program element is structured to evaluate the cost and operational effectiveness of residential and intermediate batteries to reduce system peak, resolve feeder constraint, and manage high penetration of rooftop solar PV. The program will also evaluate residential battery control system operations to provide customer bill savings and utility peak load needs, and measure the resulting benefits for use in future cost effectiveness analysis.

The Thermal Storage program element is structured to evaluate the cost and operational effectiveness of grid interactive water heaters to help flatten duck curve load shapes and support operational integration of high penetrations of rooftop solar PV. The program will measure load shifting potential and resulting benefits for use in future cost effectiveness analysis.

The Demand Response element of the program will leverage data from participating smart thermostats to verify the demand response impacts achieved for each peak event. The effectiveness of pre-cooling strategies for shifting load and increasing peak demand savings will also be evaluated.

2017 Program Budget

Program Element	**Rebates and Incentives ($)**	**Training and Technical Assistance ($)**	**Customer Education ($)**	**Program Implementation ($)**	**Marketing ($)**	**Planning and Administration ($)**	**TOTAL ($)**
Battery Storage - Residential Scale	$850,000	$25,000	$50,000	$190,000	$75,000	$50,000	**$1,240,000**
Battery Storage - Intermediate	$10,000	$25,000	$0	$949,000	$0	$50,000	**$1,034,000**
Thermal Storage	$560,000	$30,000	$40,000	$110,000	$100,000	$50,000	**$890,000**
Demand Response	$300,000	$0	$50,000	$239,000	$214,000	$31,000	**$834,000**
TOTALS	**$1,720,000**	**$80,000**	**$140,000**	**$1,488,000**	**$389,000**	**$181,000**	**$3,998,000**

Estimated Energy Savings

Element	Technology	Estimated Participants and/or installations	Estimated Peak Demand Savings kW/unit	Estimated Peak Demand Shift MW[4]
Battery Storage	Residential Scale Batteries	50	5.0	0.25
Battery Storage	Intermediate Feeder Scale Batteries	4	100 to 200	0.60
Thermal Storage	Grid connected heat pump storage water heaters	400	2.5	1.00
Demand Response	DR enabled smart thermostats	6,000	1.9	11.4
			TOTAL	13.25

[4] Load shift may include peak load shaving, duck curve mitigation, or both based on program element.

Program Cost Effectiveness

According to Decision No. 75769, "given the developing nature of this energy storage technology program, the Commission will waive its normal benefit cost threshold." APS intends to carefully track program costs and benefits during implementation, and report on cost effectiveness in the DSM Annual Progress Report to be filed on 3/1/18.

Conclusion

The proposed DRESLM Program balances a variety of residential DR and load management technologies to support peak load management and address operational challenges of high penetration solar PV. The program offers a compelling customer value proposition while deploying many elements at targeted locations to meet distribution level challenges. APS respectfully requests that the Commission approve DRESLM Program as filed in time to support customer recruitment for applicable program elements in advance of the summer peak load.